

## CLAIMS

1. A method for a packet mode group voice communication in a communications system, comprising the steps of  
providing a group server on top of the said communications system,  
5 providing said group server with individual addresses of group members in at least one group communication group,  
sending voice packets from one of said group members to said group server, each voice packet being addressed to said at least one group,  
forwarding said voice packets individually to each receiving one of  
10 said group members on the basis of said individual addresses.
2. A method according to claim 1, wherein said step of forwarding comprises a step of forwarding said voice packets individually via user servers provided on top of the said mobile communications system, said user servers managing user specific voice packet streams to and from users.
- 15 3. A method for packet mode group voice communication in a communications system, comprising the steps of  
providing a group server,  
providing said group server with individual addresses of group members of a group communication group,  
20 creating an individual logical connection from each group member to said group server by means of outband signaling,  
starting a speech item in said group by sending a leader packet from one of said group members to said group server over said individual logical connection, each leader packet containing the identifier of the respective  
25 group member,  
said group server either i) rejecting said started speech item, or ii) granting the started speech item to said one group member and forwarding said leader packet and subsequent voice packets individually to each receiving one of said group members in said group on the basis of said individual  
30 addresses.
4. A method according to claim 3, comprising the further steps of  
allocating an uplink bearer for said one group member in an air interface of said communications system prior to said one group member sends said leader packet and prior to said granting of said speech item, and  
35 allocating a downlink bearer in an air interface for each receiving group member in response to receiving a leader packet forwarded by said group server and addressed to said respective group member.

5. A method of managing speech items in a communications system having a packet mode group voice communication feature, comprising the steps of

5 providing a group server for serving a group communication group,  
granting a speech item to one group member of said group communication group,

setting a first timer to measure a predetermined idle period in response to said granting,

10 resetting said first timer each time a voice packet is received from said one of said group members to said group server,

ending said granted speech item if said first timer expires indicating that said predetermined idle period has elapsed from said granting or from last reception of a voice packet from said one group member.

15 6. A method according to claim 5, comprising the further step of ending said granted speech item if a maximum allowed period of time has elapsed from the granting.

7. A method according to claim 5, comprising the further steps of  
said one group member sends a trailer packet having a predetermined payload in order to indicate the end of sending,  
20 the group server ends said speech item in response to receiving said trailer packet.

8. A method of managing traffic streams in a communications system having a packet mode group voice communication feature, comprising the steps of

25 providing a server for managing traffic streams addressed to a user who is active in at least one group communication group or in a one-to-one communication,

receiving at said user specific server a first voice packet stream related to a first group or one-to-one communication and forwarding said first  
30 voice packet stream to said respective user,

monitoring at said user specific server continuity of said first voice packet stream,

35 receiving at said user specific server at least one further voice packet stream related to at least one further group or one-to-one communication,

forwarding no one of said at least one further voice packet streams to said user if said first voice packet data stream is continuous,

forwarding one of said at least one further voice packet streams to said user if said first voice traffic stream has been discontinued for a predetermined period of time.

5 9. A method according to claim 8, wherein said step of monitoring comprises the further steps of

setting a timer to measure said predetermined period of time when a first packet of said first voice packet stream is forwarded to said user;

resetting said timer each time a new packet of said first voice packet stream is forwarded to said user,

10 determining said first voice packet stream to be discontinued if said timer expires.

10. A method according to claim 8 or 9, said method comprising a further step of

15 interrupting said first voice packet stream immediately when a voice packet stream having higher priority is received at said server.

11. A server system for providing a packet mode group communication service for a communications system, said server system comprising a group server provided on top of said communications system, said group server further comprising

20 a data memory storing individual addresses of group members in at least one group communication group,

a mechanism receiving voice packets from said group members, each received voice packet containing information identifying the communication group which the respective packet is addressed to,

25 a mechanism for granting a speech item to one group member per a communication group in turn,

30 a mechanism unicasting each voice packet received from said group member having a speech item in a group communication group separately to each receiving member in said respective group communication group on the basis of said individual addresses.

12. A server system according to claim 11, wherein said information identifying the communication group identify a port assigned to said group in said group server.

35 13. A server system according to claim 11, further comprising a call processing server provided on top of said mobile communications system, said call processing server being responsible for control plane management of the group communications in said group server.

14. A server system according to claim 11, wherein said mechanism granting a speech item further comprises

a first timer responsive to said granting the start of the measurement of a predetermined idle period from said granting,

5 a mechanism resetting said first timer each time a voice packet is received from said one group member having said granted speech item,

a mechanism ending said granted speech item if said first timer expires indicating that said predetermined idle period has elapsed from said granting or from the last reception of a voice packet from said one group member.

15. A server system according to claim 13, said system further comprising a mechanism establishing an individual logical connection from each group member to said group server by means of outband signaling carried out between said call processing server and each group member, and wherein said mechanism granting a speech item further comprises

a mechanism receiving a leader packet starting a speech item in said group from one of said group members to said group server over respective said individual logical connection, said leader packet containing identifier of the respective group member,

20 a mechanism that either i) rejects said started speech item, or ii) grants said started speech item to said one group member and forwards said leader packet and subsequent voice packets individually to each receiving one of said other members in said group on the basis of said individual addresses.

16. A server system according to claim 11, wherein said voice packets are VoIP packets.

17. A server system according to claim 11, said server system further comprising group management server providing a user interface for a remote creation and management of group communications group in said server system.

30 18. A server system according to claim 17, wherein said user interface is based on one of the World Wide Web (WWW) and Wireless Application Protocol (WAP) technologies.

19. A server system according to claim 11, wherein said group server is interconnected to said mobile communications network by an Internet Protocol (IP) based network.

35 20. A server system for providing a packet mode group communication service for a communications system, said server system comprising a

group server provided on top of said communications system, said group server further comprising

a mechanism which identifies and authenticates a source of group communication,

5 a mechanism which controls that only one group member in a group talks at a time,

a mechanism which checks active group members in a group to which voice packets from a currently talking group member are destined to and generates from an incoming voice packet an outgoing packet to be forwarded separately to each of said active group members, and

10 a mechanism which selects from possible multiple incoming traffic streams destined to one group member the one which is to be forwarded to said one group member.

21. A server system for providing a packet mode group communication service for a communications system; said server system comprising

15 at least one first server providing group specific communications functions, said first server further comprising

a data memory storing individual addresses of group members in at least one group communication group,

20 a mechanism receiving voice packets from said group members, each received voice packet containing information identifying the communication group which the respective packet is addressed to,

25 a mechanism for granting a speech item to one group member per communication group in turn,

a mechanism unicasting each voice packet received from said group member having a speech item in a group communication group separately to each receiving member in said respective group communication on the basis of said individual addresses,

30 a second server providing user-specific communications functions, any group related communication from a user managed by said second server being routed first to said second server and then forwarded to an appropriate first server, and any unicast voice packet from said at least one first server being routed first to said second server prior to sending the voice packet to the  
35 respective user.

22. A server system according to claim 21, wherein said information identifying the communication group identify a port assigned to said group in said group server.

23. A server system for providing a packet mode group communication service for a communications system, said server system comprising  
5 at least one group server providing group specific communications functions, said group server further comprising

a mechanism which controls that only one group member in a group talks at a time,

10 a mechanism which checks active group members in a group to which voice packets from a currently talking group member is destined to and generates from an incoming voice packet an outgoing packet to be forwarded separately to each of said active group members,

15 a user server providing user-specific communications functions on a user plane, said user server further comprising

a mechanism which identifies and authenticates a source of group communication,

20 a mechanism which selects from possible multiple incoming traffic streams destined to one group member the one which is to be forwarded to said one group member.

24. A server system according to claim 23, said system further comprising

25 a group call processing server provided on top of the said communications system, said group call processing server being responsible for control plane management of the group communications in said group server, and

a user call processing server provided on top of said communications system, said user call processing server being responsible for control plane management of the communications in said user server.

30 25. A server system according to claim 23, wherein said mechanism which manages that only one group member in a group talks at a time further comprises

a first timer responsive to a grant of a speech item for starting to measure a predetermined idle period from said granting,

35 a mechanism resetting said first timer each time a voice packet is received from said one group member having said granted speech item,

a mechanism ending said granted speech item, if said first timer expires indicating that said predetermined idle period has elapsed from said granting or from last reception of a voice packet from said one group member.

26. A server system according to claim 23, said system further comprising a mechanism establishing an individual logical connection between each group member and said user server by means of outband signaling carried out between said user call processing server and each group member, and wherein said mechanism which manages that only one group member in a group talks at a time further comprises

10 a mechanism receiving a request for a speech item in said group from one of said group members to said group server over respective said individual logical connection, said request being in form of a leader packet containing identifier of the respective group member,

15 a mechanism that either i) rejects said request for a speech item, or ii) grants the speech item to said one group member and forwards said leader packet and subsequent voice packets individually to each receiving one of said other members in said group.

27. A server system according to claim 23, wherein said voice packets are VoIP packets.

20 28. A server system according to claim 22, said server system further comprising group management server providing a user interface for a remote creation and management of group communications group in said server system.

25 29. A server system according to claim 28, wherein said user interface is based on one of the World Wide Web (WWW) and Wireless Application Protocol (WAP) technologies.

30 30. A server system according to claim 23, wherein said group server is interconnected to said mobile communications network by an Internet Protocol (IP) based network.

31. A server system for providing a packet mode group communication service for a communications system, said server system comprising at least one group server providing group specific communications functions in a user plane, said group server further comprising

35 a data memory storing individual addresses of group members in at least one group communication group,

a mechanism receiving voice packets from said group members, each received voice packet containing information iden-

tifying the communication group which the respective packet is addressed to,

a mechanism for granting a speech item to one group member per communication group in turn,

5 a mechanism unicasting each voice packet received from said group member having a speech item in a group communication group separately to each receiving member in said respective group communication on the basis of said individual addresses,

a user server providing user-specific communications functions on a user plane, any group related communication from a user managed by said user server being routed first to said user server and then forwarded to an appropriate group server, and any unicast voice packet from said at least one group server being routed first to said user server prior to sending the voice packet to the respective user,

15 a group call processing server responsible for control plane management of the group communications in said group server, and

a user call processing server responsible for control plane management of the communications in said user server.

20 32. A device of managing speech items in a communications system having a packet mode group voice communication feature, comprising

a mechanism granting a speech item to one group member in group communication group at time,

a first timer responsive to said granting for starting to measure a predetermined idle period from said granting,

25 a mechanism resetting said first timer each time a voice packet is received from said one of said group members,

a mechanism ending said granted speech item, if said first timer expires indicating that said predetermined idle period has elapsed from said granting or from last reception of a voice packet from said one group member.

30 33. A device for managing traffic streams addressed to a user who is active in at least one group communication group or in one-to-one communication in a mobile communications system having a packet mode group voice communication feature, said device comprising

35 a first mechanism capable of receiving at least two voice packet streams related to at least two group or one-to-one communications,

a second mechanism monitoring continuity of said forwarded voice packet streams,



said first mechanism forwarding no other one of said received voice packet streams related to at least one further group or one-to-one communication, if said first voice packet stream is continuous, and selecting and forwarding other one of said voice packet streams to said user if said previous selected and forwarded voice traffic stream has been discontinued for a pre-determined period of time.

34. A device according to claim 33, wherein said monitoring mechanism further comprises

a timer which is set to measure said predetermined period of time when a first packet of said selected voice packet stream is forwarded to said user,

a mechanism resetting said timer each time a new packet of said selected voice packet stream is forwarded to said user,

a mechanism determining said selected voice packet stream to be discontinued if said timer expires.

35. A device according to claim 33, said device further comprising

a mechanism interrupting said first voice packet stream immediately when a voice packet stream having higher priority is received.

36. A method for establishing a one-to-one voice communication in a communications system, comprising the steps of

providing a communication server on top of the said mobile communications system,

creating an individual logical connection between said communication server and each user having an active communication service in said communication server,

starting a communication by sending a leader packet from a user to said communication server over respective said individual logical connection, each leader packet containing identifier of said sending user and a receiving user,

said communication server either i) rejects said started speech item, or ii) grants the started speech item to said sending user and forwards said leader packet and subsequent voice packets to said receiving user on the basis of said received identifier of said receiving user.

37. A method according to claim 36, wherein said step of forwarding comprises the further steps of

inquiring an IP address of said receiving user from a communication control server on the basis of said received identity of said receiving user,

forwarding said leader packet and subsequent voice packets to said IP address of said receiving user.

38. A method according to claim 36, wherein said sending user sends the leader packet and the subsequent packets to a specific port assigned for one-to-one communication in said communication server.

39. A subscriber equipment for communications system having a packet mode group voice communication service, said subscriber equipment comprising

mechanisms for packet data communication over said mobile a communications system,

a group communication application on top of said mechanisms, said application having a mechanism establishing a logical packet connection to a group communication server,

said application having a mechanism sending and receiving voice packets to and from said group communications server.

40. A subscriber equipment according to claim 39, said equipment further comprising

a push-to-talk switch,

a mechanism which, reactive to activation of said push-to-talk switch by a user, sends a leader packet followed by voice packets to said group communication server over said logical connection and thereby starts a speech item,

said mechanism, reactive to receiving an indication that a speech item is not granted to the user is received from said group communication server after sending said leader packet, stops sending further packets and stops the speech item although the push-to-talk switch is still activated,

said mechanism, reactive to deactivation of said push-to-talk switch by the user, stops the speech item and stops sending further voice packets.

41. A subscriber equipment according to claim 40, wherein said mechanism, reactive to deactivation of said push-to-talk switch by the user, sends a trailer packet to said group communication server over said logical connection and thereby stops the speech item.

42. A subscriber equipment according to claim 40, wherein said indication is a reception of a voice or leader packet originating from another user in a group communication group after sending said leader packet.

43. A subscriber equipment according to claim 40, wherein said indication is the reception of a voice packet having predetermined payload type after sending said leader packet.

5 44. A subscriber equipment according to claim 40, comprising a mechanism, which in response to the reception of said indication, alerts the user of the fact the speech item was not granted.

45. A subscriber equipment according to claim 40, wherein said mechanism, reactive to deactivation of said push-to-talk switch by the user, sends a trailer packet to said group communication server over said logical  
10 connection and thereby stops the speech item.

46. A subscriber equipment according to claim 40, said equipment further comprising

a mechanism giving an audible indication to the user start speaking after the activation of said push-to-talk switch.

15 47. A subscriber equipment according to claim 46, wherein said indication mechanism comprises a timer enabling said audible indication after a predetermined period of time has expired from said activation of said push-to-talk switch.

20 48. A subscriber equipment according to claim 46, wherein said indication mechanism gives said audible indication after one of the connection setup phases has been reached; 1) after an uplink bearer has been allocated, 2) after said leader packet has been sent, 3) after said group communication server has processed said leader packet and granted a speech item, 4) after a receiving party has acknowledged said leader packet.